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## DISPLAY OF VISUAL DATA AS A FUNCTION OF POSITION OF DISPLAY DEVICE

This application claims the benefit of U.S. Provisional Application Ser. No. 60/531,284, filed Dec. 19, 2003, the entire content of which is incorporated herein by reference.

### TECHNICAL FIELD

The invention relates to display of visual data.

### BACKGROUND

Many devices include displays that can present visual data, such as pictures, graphs and animation. Some of the devices, such as tablet computers, laptop computers and personal digital assistants (PDAs), may have comparatively small displays, and may not be able to present the visual data without significant loss of detail. Further, there are many situations in which it may be desirable to present visual data to a group, but the displays may be too small for an effective presentation.

### SUMMARY

In general, the invention is directed to techniques by which visual data is mapped to a display device as a function of the position of the display device. The invention may support such mapping with any number of display devices, which may cooperate to behave as a large display device. In addition, the invention supports dynamic monitoring of the positions of display devices, with the visual data being mapped to a display device changing as its position changes.

A position processor determines the position of a particular display device with respect to a position reference. The relative position of the display device may be a function of its distance from the position reference, and its orientation with respect to the position reference. The invention is not limited to any technique for assessing the position of a display device, and includes, for example, determining the position of a display device optically, electromagnetically and tactilely. A display processor parses the visual data and maps or assigns a portion of the visual data to a display device as a function of the relative position of the display device.

In some variations of the invention, several display devices may cooperate to present visual data. Each display device presents a portion of the visual data, and the portion mapped to each display device depends upon that display device's relative position. In another variation of the invention, a single display device can present visual data by displaying a portion of the visual data at one time. The portion of the visual data mapped to the display device depends upon the position of the display device relative to a position reference, and as the position of the display device changes, the displayed visual data changes as well.

One implementation of the invention provides for one display device to include a processor that performs the functions of position reference, position processor and display processor. This "master" display device may track the position of other "subservient" display devices with respect to its own position. The "master" display device may further map visual data to itself and to the "subservient" display devices as a function of their respective positions.

In one embodiment, the invention is directed to a method that includes mapping a first portion of visual data to a first display device as a function of a position of the first display device relative to a position reference and mapping a second portion of the visual data to a second display device as a

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function of a position of the second display device relative to the position reference. The method may further include determining the respective positions, and mapping a different portion of the visual data to a device when its position changes.

In another embodiment, the invention is directed to a method comprising mapping a first portion of visual data to a display device as a function of a first position of the display device relative to a position reference, and mapping a second portion of the visual data to the display device as a function of a second position of the display device relative to the position reference. This embodiment may further support display of visual data on multiple display devices.

In further embodiments, the invention is directed to computer-readable media comprising instructions for causing a programmable processor to carry out any of the methods of the invention.

In an additional embodiment, the invention presents a system comprising a display device, a position processor configured to determine a position of the display device with respect to a position reference, and a display processor configured to map a portion of visual data to the display device as a function of the position.

The details of one or more embodiments of the invention are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the invention will be apparent from the description and drawings, and from the claims.

### BRIEF DESCRIPTION OF DRAWINGS

FIG. 1A is a block diagram illustrating determination by a position processor of positions of display devices relative to a position reference.

FIG. 1B is a block diagram illustrating mapping of visual data by a display processor to display devices.

FIG. 2 is a plan view of a set of display devices that cooperate to present visual data.

FIG. 3 is a plan view of another set of display devices that cooperate to present visual data.

FIG. 4 is a plan view of another set of display devices that cooperate to present visual data.

FIG. 5 is a flow diagram illustrating operations of a position processor and a display processor.

FIG. 6 is a plan view of a single display device that presents different portions of visual data.

### DETAILED DESCRIPTION

FIGS. 1A and 1B are conceptual diagrams illustrating embodiments of the invention. Systems 10A and 10B demonstrate positional and content-based aspects of the invention. In a typical embodiment, the positional and content-based aspects may be combined in a single system, but FIGS. 1A and 1B shows the systems as separate for purposes of explanation and clarity.

Systems 10A and 10B each include a set of two or more display devices 12A to 12N (hereafter 12). Display devices 12 may comprise any devices configured to display visual information, such as display screens of personal digital assistants (PDAs), display screens of personal computers, display screens of tablet computers, stand-alone displays, monitors and televisions. Display devices 12 cooperate to present visual data to one or more users, and present the visual data according to the positions of display devices 12 relative to one another.

Visual data may include any information displayable on a display device. Visual data includes, but is not limited to, text,